# FOOD TECHNOLOGY

Published Monthly by

The Institute of Food Technologists

Volume 3 | February, 1949 | Number 2

**Editor**

C. Olin Ball
408 E. Broadway
Maumee, Ohio

**Associate Editors**

W. H. Cathcart
National Bakery Division
Great Atlantic & Pacific Tea Company
420 Lexington Avenue, New York 17, New York

H. C. Diehl
Refrigeration Research Foundation, Inc.
410 Mercantile Building, Berkeley 4, California

Herman W. Dorn
Irwin, Neisler Company, Decatur, Illinois

Charles N. Frey
Fleischmann Laboratories
Standard Brands, Inc., New York, New York

Warren H. Goss
Scientific Research and Technical Development Department
Pillsbury Mills, Inc., Minneapolis 2, Minnesota

J. L. Heid
Florida Citrus Canners Cooperative
Lake Wales, Florida

W. Ray Junk
California & Hawaiian Sugar Refining Corp.
215 Market Street, San Francisco 5, California

M. L. Laing
Armour and Company, Chicago 9, Illinois

L. S. McClung
Department of Bacteriology, Indiana University
Bloomington, Indiana

Emil M. Mrak
Food Technology Division
University of California, Berkeley, California

Aksel G. Olsen
Central Laboratories, General Foods Corporation
1125 Hudson Street, Hoboken, New Jersey

Bernard L. Oser
Food Research Laboratories, Inc.
Long Island City, New York

Bernard E. Proctor
Department of Food Technology
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

H. A. Schuette
University of Wisconsin, Madison 6, Wisconsin

G. C. Scott
Minnesota Valley Canning Company
Le Sueur, Minnesota

Paul F. Sharp
The Golden State Company
425 Battery Street, San Francisco, California

Harry W. von Loesecke
U. S. Department of Agriculture, Washington, D. C.

Paul C. Wilbur
Food Machinery Corporation, San Jose, California

**Committee on Publications**

Walter D. Phateplace, *Chairman*
Philip K. Bates
John T. Knowles
H. C. Diehl, *Ex Officio*

## CONTENTS

Editorial

Neglected Aspects of Food Technology . . . . . 39

Use of Ion Exchangers in By-Product Recovery from Pineapple Waste. George E. Felton . . . . . 40

Ion Exchangers in Food Processes. A. B. Mindler . . 43

Commercial Ion-Exchange Purification of Sugar-Bearing Solutions. B. N. Dickinson . . . . . 48

Pressure Hydrolysis of Proteins. Lloyd A. Hall . . . 51

The Influence of Heat-Processing on the Functional and Nutritive Properties of Protein. Daniel Melnick and Bernard L. Oser . . . . . 57

The Effect of Acid Foods on Aluminum Cooking Utensils. Charles F. Poe and Janett M. Leberman 71

Notes and Letters

Role of Monosodium Glutamate in Seasoning . . 7

Quality Control in Frozen Poultry . . . . . 7

News of the Institute . . . . . 4

News of Regional Sections . . . . . 5

Book Review . . . . . 8

Selected Abstracts . . . . . 9

Authors of papers intended for publication in Food Technology should request from the Editor's office a copy of a booklet, titled "Suggestions to Authors," and see that their papers are in the form specified therein before they are sent to the editor.

The Institute of Food Technologists assumes no responsibility for statements in contributed articles appearing in Food Technology. Editorials present only opinions of the writers and do not necessarily reflect policies of the Institute of Food Technologists.

# News of the Institute

## MESSAGE FROM THE PRESIDENT OF THE INSTITUTE

San Francisco and the annual Institute Conference on July 10 to 14, 1949—that is, or should be, the objective of every Institute member in his resolutions for the New Year.

For the Institute, the second decade of progress is beginning; for California, the second century of Statehood and advancement from the initial Gold Rush, which focussed attention on the West Coast, is commencing.

"Be a Forty-Niner" is a much-used phrase during these days, but your President would like to urge you to decide now that the Institute Conference gives you the opportunity, unequalled probably for years, to combine vacation and professional interest in a trip to California when the season is best and in a year when the Fiesta spirit is buoyantly present from the Oregon border to the Mexican line and from the Sierras to the Pacific Ocean.

The Conference program with its featured speakers on food problems of the nation and the world, its sessions on production and research, its symposia and subject matter round tables, is replete with matters of interest to every food technologist, regardless of his field of activity. The Exposition, which accompanies the Conference, will doubtless be the largest and most attractive ever conducted by the Institute.

And when the professional day is done and relaxation is desired, no city in America has more to offer in varied entertainment, historical interest and scenic beauty than the City of Saint Francis.

On your return home, if you are interested in the marvels of the evergreen country of the American-Canadian Pacific Northwest or the famed attractions of the Southwest and of Mexico, you need only turn your faces North or South and complete the round trip to your homes.

You'll never forget the trip as a vacation and you'll never forget the Conference and its Exposition as the equal of many fine annual meetings in other parts of the country.

The Institute and its President invite you to "Be a Forty-Niner" and take to the Gold Rush Trail to California and the West next July.

## RECOGNITION

Dr. Ellery H. Harvey, past President of the national I. F. T., was awarded the Army-Navy certificate of appreciation "in recognition of outstanding civilian service rendered during World War II," at a joint Army-Navy ceremony held in New York, December 10, 1948.

George R. Cowgill, Professor of Nutrition at Yale University and a national member of I. F. T., received the 1948 Scientific Award of the Grocery Manufacturers of America at their annual meeting in New York City, November 15, 1948. This award was made to Professor Cowgill for "his fundamental contributions to the science of nutrition, particularly his research on the functional role of vitamin $B_1$, his success as a teacher of young biochemists, and his outstanding editorial work for the *Journal of Nutrition.*"

Paul B. Christensen, Vice-President of the Merchants Refrigerating Company, New York City, and a national member of I. F. T., has been asked to serve in an advisory capacity for the Brazilian government regarding the economic feasibility of constructing a refrigerated warehouse in Brazil. During the latter part of 1948 he spent approximately two months traveling in Brazil to conduct a survey on this project.

Dr. George J. Hucker, national I. F. T. President in 1947-48 and Professor of Bacteriology at the New York State Agricultural Experiment Station, has been made District Governor of Rotary. In this latter capacity he has addressed the Rotarians of Rochester, New York.

## DEATH

Anderson Wheeler Ralston, 49, Assistant Director of Research of the Chemical Research and Development Department, Armour & Co., died suddenly on December 5, 1948, of a heart ailment. Dr. Ralston received his Ph.D. degree from Iowa State College in 1927. Since 1931 he had been associated with Armour & Co., where he was concerned primarily with the chemistry of fats, fatty acids, and their derivatives. He had published extensively in technical journals and had been granted over 100 patents. In 1945 he held the Foster Memorial Lectureship at the University of Buffalo and in 1946 was the recipient of the Midwest Award of the St. Louis Section of the American Chemical Society for his outstanding contributions in the field of fatty acid derivatives. His book "Fatty Acids and Their Derivatives," published early in 1948, is a major treatise in the field. He is survived by his widow and one son, to whom the Institute of Food Technologists express their sincere sympathy.

## AGENDA FOR JANUARY COUNCIL MEETINGS

The following topics were those proposed for discussion at the Council Meetings held at the Hotel Lafayette in Atlantic City, on January 16. They are printed at this time to let members know what our Council is doing.

1. San Francisco Meeting 1949; Chicago Meeting 1950; New York Meeting 1951; invitation from Great Lakes Regional Section 1952.
2. Need for a new Directory of Members.
3. Change the word "Affiliate" Member to "Associate" Member wherever it appears in the Constitution.
4. Handling of Employment Bureau.
5. Should Secretary obtain approval of officer nominees before their names appear on ballot?
6. Honorary memberships.
7. Status of student and student clubs.
8. Control of editorial policy by Council.
9. Authorize Secretary-Treasurer to purchase record file.
10. Machinery for appointment of editor, publisher, Secretary-Treasurer, etc., at Annual Meetings.
11. Discussion of advertising policy.
12. Discussion of paid Executive Secretary.
13. Policy on foreign branches.
14. Regional Sections and Regional Associates.
15. Constitutional changes.

# Regional Section News

## CHICAGO SECTION

At the annual business meeting of the Chicago Section held on December 13, 1948, the following announcements were made:

Reorganization of *The Vitalizer* staff has included acceptance of the resignation of Editor Lloyd A. Hall with regret and thanks for a job well done, appointment of Milton E. Parker as Editor, and appointment of A. Adajian as Managing Editor.

As Chairman of the Committee on Incorporation, Byron M. Shinn presented a report of that Committee, recommending that the Section be incorporated as a corporation not for profit and that the by-laws of the Section be revised to comply with the requirements of the "General Not for Profit Corporation Act." A motion was passed empowering Shinn to appoint a committee to suggest rewording of the by-laws to meet the requirements of the Act.

As Business Manager of *The Vitalizer,* Byron Shinn reported that this publication had been self-sustaining throughout the year 1948.

A committee has been appointed to recommend I.F.T. representatives on the C. T. S. C. Inter-Society Press Committee.

The following officers were elected for 1949:

Chairman: C. L. Smith.
Vice-Chairman: R. A. Isker.
Secretary: J. M. Jackson.
Treasurer: G. E. Brissey.
Executive Committee, 1949-50 Term: L. R. Hedrick, W. E. Pearce.
Section Councilors, 1949-50 Term: R. A. Isker, G. C. North, B. M. Shinn.

The Section participated in the first Chicago area Career Conferences for high school students, held on December 28-30 under the sponsorship of the Chicago Technical Societies Council, the Chicago *Sun-Times* newspaper, and the Illinois Institute of Technology. Mr. E. S. Stateler served as counselor and G. E. Brissey, J. M. Jackson and C. L. Smith as session chairmen.

On January 24, the Chicago Section heard an interesting talk by Mr. W. J. Scarlett of Wallace & Tiernan Co. entitled "Chlorination Applied to the Food Industry."

The December, 1948 issue of *The Vitalizer* contains a tribute to the retiring Chairman of the Chicago Section, E. S. Stateler, who has been intimately associated with the growth of the Section and concurrently with the progress of the national organization. He has served as Secretary, Vice-Chairman, Chairman, and Section Councilor of the Section, and in the national organization he has been the head or chairman of the following committees: Editorial, Publicity, Auditing, Public Relations, Budget, Program, and Constitution. His unselfish interest, unlimited energy, and unquestioned devotion have played an important role in the success of the Chicago Section.

In the autumn of 1948 Professor Milton E. Parker addressed the National Baker Supply House Association at the Edgewater Beach Hotel on "The Path to Quality through Product Control."

Robert W. Bates, formerly head of the Research Bakery, Refinery Pilot Plant, and Inedible Products Development Section of Armour & Co., has been promoted to Assistant Director of Development.

Colonel R. A. Isker, wartime Commanding Officer of the Quartermaster Corps Research and Development Laboratory, has been appointed to serve as Secretary of the Associates Food and Container Institute and reports for duty on Tuesdays and Fridays.

Vincent J. Del Giudice of the Bacteriological Research Laboratory, Armour & Co., gave a paper on "The Incidence of Putrefactive Anaerobes in Pork" at a meeting in Peoria. Dr. L. A. Harriman, Chief Bacteriologist, Byron Shinn and Rex Hansen of the Canning Technology and Animal Nutrition Sections, Armour & Co., assisted Vince in getting the facts for the paper.

Byron Shinn spoke before the Blue Island Women's Club on "Facts, Fables, and Foibles about Foods" at one of their 1948 meetings.

## NORTHERN CALIFORNIA SECTION

Papers for incorporation of the Section were signed on December 1, 1948, and as of that date the Section became "The Northern California Section, Inc."

In 1947 the plan was inaugurated of having voluntarily contributed papers presented at the annual meeting of the Northern California Section. This plan met with such favorable response that it was followed again for the annual meeting in 1948. Dr. C. R. Stumbo had charge of getting the program together, and fourteen papers were presented.

At the December 1948 meeting, the following officers were elected for 1949:

Chairman: W. Ray Junk, C. & H. Sugar Co., Matson Bldg., San Francisco.
Vice-Chairman: Ernest E. Jacobs, Lyons-Magnus Co., 2545 16th St., San Francisco.
Secretary: R. D. McKirahan, American Can Co., 20th and 3rd Sts., San Francisco.
Treasurer: Robert N. Berry, American Home Foods, Inc., San Jose.
Councilors: E. L. Mitchell, Richmond Chase Co., San Jose; Paul Sharp, Golden State Co., 425 Battery St., San Francisco.
Executive Committee: Maynard Joslyn, Division of Food Technology, University of California, Berkeley; Sherman Leonard, Schuckl & Co., Sunnyvale.

The second hold-over Councilors from 1948 are Emil Mrak and Tom Mansfield (Food Machinery Corp., San Jose). The second hold-over members of the Executive Committee are Glenn Sorber (Western Regional Research Laboratory, Albany, Calif.) and Clifford Smith (Owens-Illinois Glass Co., San Francisco).

In November 1948 the total membership of the Section was over 400.

H. C. Diehl, Director of the Refrigeration Research Foundation, Berkeley, and present national I. F. T. President, has accepted appointment as consultant to the Western Regional Research Laboratory, Albany, California. In this position he will be available for advice and consultation on this Laboratory's food research.

Hobart R. Halloran has been appointed Director of Laboratories for the Poultry Producers of Central California (Petaluma). He is in charge of Feed Quality Control and Nutritional Studies. Formerly he was

Manager of the Feed Products Department of Collett-Week-Nibecker, Inc., San Francisco.

Another national issue of *The Hornblower* is to be published soon after the first of the year, giving members up-to-date information on programs, hotel reservations, and transportation for the 1949 convention in San Francisco.

Tentative meeting dates for the Section in 1949 are: February 17, April 21, June 16, August 18, October 20, and December 1. Any members of the Institute who expect to be in San Francisco on or about these dates and who are willing to give a talk before the Section are asked to write to Ernest E. Jacobs (Lyons-Magnus Inc., 2545 16th St., San Francisco 3) so that space can be provided for them on the program.

## NORTHEAST SECTION

At its December meeting, the Section was honored by a visit from Dr. Louis B. Howard, formerly Chief of the Bureau of Agricultural and Industrial Chemistry, U. S. D. A., and now head of the Department of Food Technology, University of Illinois. Dr. Howard was at the time visiting the Departments of Food Technology at M. I. T. and the University of Massachusetts.

The Fisheries Technology Group has found it convenient to meet on the afternoons of the Northeast meetings, a practice that other technical groups might copy.

Dr. Kenneth C. D. Hickman, inventor of the modern molecular still, is now associated with Arthur D. Little, Inc., at Cambridge, as well as with the Eastman Kodak Co. Dr. Hickman will divide his time between Rochester and Cambridge.

Ernest C. Crocker of Arthur D. Little, Inc., was a touring speaker for the American Chemical Society this fall, speaking on "The Chemistry of Flavor." He spoke before A. C. S. Sections in Toledo, Ohio; Detroit, Kalamazoo, Lansing, and Ann Arbor, Michigan; Charleston, W. Va.; Cincinnati, Ohio; and Indianapolis and Terre Haute, Indiana.

Professor William L. Campbell has been appointed Executive Director of the Corporation Committee on Financing Development at the Massachusetts Institute of Technology. The objective of the Financing Development Program is to raise $20,000,000 for new construction, additional endowment, and unrestricted funds for M. I. T.

Meetings of the Northeast Section for early 1949 are planned as follows:

February 3. Fisheries Symposium, under direction of Professor B. E. Proctor.
March 31. Candy Problems, under direction of Newton Cole.
May 14. Amherst meeting, under direction of Professor Carl R. Fellers.

Mr. Mason T. Rogers has a severe case of thrombosis, which will probably confine him to his home for some time to come. His home is at 48 Cedar Road, Belmont, Mass., and we are sure he will be glad to hear from his friends all over the country. Let's see that he does.

## SOUTHERN CALIFORNIA SECTION

On December 15, 1948, the Section held a dinner meeting in Los Angeles, following which Dr. Ernest Geiger gave a talk on "Some Physiological Aspects of Nutrition." Dr. Geiger is Director of Research, Van Camp Sea Food Company, and Professor of Experimental Pharmacology and Toxicology at the University of Southern California.

The program calendar of the Section for 1949 is as follows:

January 19. Place: California Consumers Corp., Pasadena. Program: Industrial Meeting. Mr. R. M. Hagen will give a talk on "Frozen Foods," which will be followed by a tour through the plant.
February 16. Place: Rodger Young Auditorium. Speaker: Dr. F. R. Goetzl, Permanente Foundation, Oakland. Subject: "Physiological Aspects of Flavors."
March 16. Place: Rodger Young Auditorium. Speaker: Dr. R. W. Hodgson, University of California, Los Angeles. Subject: "Principal Factors Responsible for the Development and Success of the California Fruit Industry."
April 20. Place: General Mills—Atlantic and Olympic. Program: Industrial Meeting. Talk by Mr. G. W. Hosfield, Pillsbury Mills. Tour through the plant.
May 18. Place: Rodger Young Auditorium. Speaker: Dr. Robert Stewart, Gerbers Products Co., Oakland. Subject: "Baby Foods."

## NEW YORK SECTION

Dr. Lawrence Atkin has rejoined Standard Brands, Inc., after having been for several years with the Wallerstein Laboratories.

Meyer Moskowitz, who was formerly connected with the research departments of Corn Products Refining Company and the Doughnut Corporation of America, has become the Eastern Associate of the consulting firm of James F. Walsh and Associates and has his headquarters in New York City.

Thomas H. Derby, formerly with the Maxson Food Systems, Inc., has joined the Market Development Program of the Sylvania Division, American Viscose Corporation, New York.

Herbert S. Madsen, who was formerly Staff Technologist of the New York Headquarters Staff of General Foods' Department of Research and Development, has been transferred to the Bireley Division in Hollywood.

## WESTERN NEW YORK SECTION

A new regional section publication appeared in the fall of 1948, entitled *The Activator*. This is the "house organ" of the Western New York Section and a worthy companion of the previously inaugurated section publications *The Hornblower* (Northern California Section) and *The Vitalizer* (Chicago Section). The front cover of *The Activator*, light grey with black lettering, is appropriately decorated with a design, in red, showing a sheaf of wheat, a microscope, and containers of canned and frozen foods.

The first issue of this publication, dated "Fall Issue of 1948," reports on the meeting held on October 30 when Dr. S. C. Prescott, Emeritus Professor of Food Technology at Massachusetts Institute of Technology, was the dinner speaker, contains an article by William Sherman, Secretary of the Association of New York State Canners, on the "History of the Canning Industry in New York State," and gives an account of the food research at the New York State Agricultural Experiment Station. Personal items of interest, a list of the current officers of the Section, and a directory of the

(Continued on page 12, following Selected Abstracts)

# Notes and Letters

## Role of Monosodium Glutamate in Seasoning

The recent surge of interest in the use of monosodium glutamate in culinary practice may be due to the currently stepped-up production schedules of those companies which for many years were unable to supply the great demand for this seasoning. The compound has since become readily available and several food laboratories, including the Army Quartermaster group, have presented series of studies on the manufacture, processing, taste, and physiology of the free amino acid and its salts. Consequently, a fuller appreciation of the potentialities as well as actual uses of glutamate has become well-established.

The report of Sjöström and Crocker on "The Role of Monosodium Glutamate in the Seasoning of Certain Vegetables" [a] presents a number of tables on the range of useful proportions of monosodium glutamate to be employed for raw, cooked, canned, and frozen vegetables. These authors comment that the naturally occurring glutamate in a number of the vegetables may contribute to the satisfying resultant flavor after cooking, although added glutamate presents a further enhancement.

Analytical studies have shown that the cooking processes (e.g., those listed in Bulletin 26-L, 1946, of the National Canners Association) commonly employed are sufficient to effect a 15-20% hydrolysis of the vegetable proteins present. While the exact amount of glutamic acid released under such conditions has not been determined in all cases, sufficient data have been accumulated to show some correlation between the natural glutamic acid present and the additional amount required to enhance the vegetable taste. The presence of sodium chloride was essential, in all cases, for the establishment of the glutamate effect in the 0.1% range, and where it was purposely omitted, poor correlation could be shown.

Similar effects were observed with cooked meats and cereals, although, in these cases, the percentage of glutamic acid released was considerably higher. In the studies made upon mammalian musculature, it was observed that the cyclized form of glutamic acid, having no glutamate flavor, also was present after the cooking process. The alpha-pyrrolidone carboxylic acid formed in this manner was extracted from the cooked products with ethyl acetate, yielding but fractional quantities as compared with the free glutamic acid present.

Of the vegetables exhibiting these conditions best, lima beans, peas, corn, and mushrooms proved to be most satisfactory.

An interesting "taste effect" of monosodium glutamate itself was noted when overwhelmingly large quantities were used. For example, when working in the packaging room where glutamate (99.5% minimum) is being sieved or poured from a hopper, an individual will inhale considerable quantities without the least degree of harm even over a period of years. However, at the early stages of exposure to the material, the typical salivation effect is experienced together with a sweet-saltiness. At the end of a working day, under such conditions, the observer will note that a residual sweetness persists with a mild cloying sensation in the pharynx. Very little seasoning was employed by the writer in subsequent meals during the period of exposure to "glutamate atmospheres," and his ability to detect threshold concentrations was considerably diminished. Panel-tasting qualities were promptly restored after a 24-hour period of absence from such atmospheres. This situation of involuntary glutamate ingestion proved also to be an appetite stimulant, since hunger contractions of the stomach were constantly evident during exposures, with the exception of the 2-hour period directly after a normal meal.

H. W. Dorn
Irwin-Neisler Company, Decatur, Illinois

[a] Food Technology 2, 317 (1948).

## Quality Control in Frozen Poultry [a]

*(Condensed)*

The poultry industry is a multi-million dollar business. An almost countless number of farms are producing poultry, either for eggs for market, eggs for hatching, or poultry for meat purposes. Thousands of dealers or processors are in the business of buying, selling, dressing, and eviscerating the results of the farm production.

The breeding flock, the hatchery, the grower and the feed manufacturer all have equally important functions and each present several problems for technical research and quality control. For the purpose of this discussion, we will pass over them to the problems that present themselves in the dressing plant, where the live chicken is prepared for market.

From a quality control viewpoint, the operations at a poultry processing plant can be grouped into about five centers of responsibility—feeding, dressing, cooling and packing, eviscerating, and freezing.

Most plants "finish feed" the poultry received at the plant. The feeding period varies from one or two days to as much as ten days, and is determined by the type of poultry being handled and the capacity of the feeding station as compared with the amount dressed daily. The purpose of the "finish feed" is to obtain uniformity of

[a] Presented before the Eighth Annual I. F. T. Convention, Philadelphia, Pa., June 7, 1948.

color of the skin, to facilitate the dressing operation which follows, and if possible, to increase the weight of the birds. Since the final quality is directly affected by this operation, problems are presented in the field of quality control. A few samples would include general sanitation of equipment, the kind of feed used, the length of the feeding period, the advantages of improved lighting and ventilation.

The next opertion has to do with the defeathering or what is commonly called the dressing of the bird. Here, many control problems are presented, a few are as follows: the method of killing and its effect on proper bleeding, the type of scald used to loosen the feathers and the temperatures used in the process, and the effect of mechanical picking equipment on the skin. Many plants dip the birds in hot wax to facilitate the defeathering. This presents problems as to the control of the wax and the temperatures at which it is applied. Each part of the dressing operation has a direct effect on the finished product and, therefore, in this one department, there are many problems that would interest a quality control man.

After the dressing operation, the next step in production has to do with proper cooling, grading, and packing. The poultry received from the dressing step usually have an internal temperature of around 100° F. The importance of proper cooling and the speed at which the body heat is removed probably presents one of the most important problems to the quality control program. Consideration also must be given to sanitation, method of cooling, length of holding after cooling and proper packaging.

A step in the poultry processing industry, which is rapidly increasing in importance, is that of the evisceration and packing of the finished product in a ready-to-cook form. Many eviscerating operations today are carried on in the same plant and take the poultry directly from the dressing operation without any cooling period; others follow the plan of eviscerating after the poultry has been cooled following dressing. A great many eviscerators carry on their operations in separate plants for that purpose only. Some use poultry that has been frozen and stored for various periods and which must pass through a defrosting process. The handling under such conditions greatly increases the need of adequate control methods as, in most cases, the initial dressing, cooling, and freezing have been done in other plants, where safe procedures in all stages of preparation may not have been practiced. A visual inspection may not detect the faulty handling, therefore, the defrosting of the frozen poultry adds many problems in the field of quality control. Aside from the problems just mentioned, the eviscerating operation presents many others as follows: the effect of final quality resulting from immediate evisceration after dressing, as compared with a cooled raw product; the proper method and length of the cooling period; the temperatures and length of safe holding periods of poultry for evisceration after dressing; the sanitation problems in connection with eviscerating equipment and personnel; the effects of washing, draining and drying of the eviscerated bird; and bacteria control.

The problems presented in the control of the freezing of the product are very important. In general practice, two types of poultry must be considered—the dressed, or New York style; and the eviscerated, or ready-to-cook pack. The basic laws or rules of freezing are the same for both and are largely controlled by the equipment at the operating plant. The need for controls to protect quality are many and consist of: packaging studies and their effect on proper freezing; the developing of proper procedures to obtain the best results with existing freezing equipment; the length of the freezing period; and the proper handling while in storage and in transportation.

Other fertile fields for quality control studies are the utilization of by-products of the operation, such as feathers, offal and fertilizer. The poultry industry is fast becoming aware of the real need for technical advice.

T. H. Ramsey
*Birds Eye—Snider Division*
*General Foods Corporation*

# Book Review

Bergey's Manual of Determinative Bacteriology, 6th Edition, by Robert S. Breed, E. G. D. Murray, and A. Parker Hitchens. The Williams and Wilkins Company, Baltimore, 1529 pages. Price $15.00.

The new edition, the sixth, of the well-known "Bergey's Manual" should be on the reference shelf of those who are concerned with the species identification of cultures isolated from natural sources and those who have other taxonomic problems. The new edition lists the essential morphological and cultural characters of over 1600 species (including 300 new ones) thereby assembling in one volume information concerning more species than is elsewhere easily avilable. The usual bibliographic references to the original literature have been retained (and even extended), thus providing for each group ready references for those who have need for the original reports. The importance of this to the busy laboratory worker is obvious.

The sections entitled "How bacteria are named and identified," and "Rules of nomenclature" have justifiably been retained as well as "A historical survey of classifications." A new feature is the source and habitat index.

In the new edition, the editors have relied to a large extent on the advice of a group of specialists each of whom has prepared the material for a particular genus or other taxonomic group with which they were most familiar. Within the framework of the classification outline the number of orders recognized has been reduced to five from seven and the family Corynebacteriaceae has been transferred from Actinomycetales to Eubacteriales. The Beggiatoaceae have been placed in the order Chlamydobacteriales. The new edition recognizes two new groups, the orders Rickettsiales and Virales, which have been placed in a supplement to the outline.

The system of classification which forms the basis of

the manual has not been accepted by all bacteriologists, particularly by those in countries other than the Americas, but without question it is used by more individuals than any other system yet proposed. Since the average worker in food research laboratories is not likely to be concerned with the finer problems of bacterial taxonomy, the present manual can safely be recommended to this group as a standard reference text.

L. S. McClung.

The Chemical Formulary, Vol. VIII, Edited by H. Bennett, Chemical Publishing Co., Inc., 1948, 448 pages. Price $7.00.

This volume, as have the others of the series, contains formulae and recipes for making a wide variety of products and for doing things.

Nutrition and Diet Therapy, 9th Edition, by Fairfax T. Proudfit and Corinne Hodgen Robinson. The Macmillan Co., 1948, 782 pages. Price $4.00.

This is the most recent revision of this standard textbook of dietetics.

Eating for Health, by Pearl Lewis. The Macmillan Co., 1948, 121 pages. Price $2.25.

The basic facts of nutrition and food utilization are discussed. Many dietary plans are given as well as information about the character and nutritive value of specific foods.

Danger! Curves Ahead! by Miriam Lincoln, M.D. The Macmillan Co., 1948, 138 pages. Price $2.50.

Overweight Is Curable, by Wilfred Dorfman, M.D., and E. Doris Johnson, M.S. The Macmillan Co., 1948, 160 pages. Price $2.75.

Both of these books are written by physicians and deal with the disadvantages, causes, effects and treatment of overweight. Corrective diets are given. *Overweight is Curable* contains tables on the composition and caloric content of foods and an extensive bibliography.

# Selected Abstracts

## ANALYTICAL METHODS

**56I. Microdetermination of lead in biological material, with dithizone extraction at high pH.**

Cholak, J., Hubbard, D. M., and Burkey, R. E. *Anal. Chem., 20,* 671-2 (1948).

The use of a procedure for the quantitative extraction of lead with dithizone at high pH has facilitated the determination of lead in biological material. The high pH extraction step has been incorporated in the final estimation step of the Bambach-Burkey method. The difficulties and advantages of the revised procedure are discussed and analytical data are given to prove the adequate nature of the revised procedure.

**57I. On the detection of aluminium by means of aluminon.**

Van Nieuwenburg, C. J., and Uitenbroek, G. *Anal. Chim. Acta, 2,* 88-91 (1948).

The well-known reaction of aluminium with aluminon has been modified in such a way as to make it specific for this element. This has been accomplished by adding sulfurous acid beforehand and ethanol and hydrochloric acid afterwards. The first reagent prevents the interference of chromium, indium, gallium, and titanium; the second, those of beryllium, scandium, zirconium and small amounts of ferric iron.

**58I. Simple thermometric apparatus for the estimation of carbon monoxide in air.**

Lindsley, C. H., and Yoe, J. H. *Anal. Chim. Acta, 2,* 127-32 (1948).

A simple, inexpensive apparatus is described for estimating the amount of carbon monoxide in air over a range of concentration from 0.01 to 0.1% or higher, with an accuracy of 0.005 to 0.01%. The carbon monoxide is oxidized by passing through a layer of Hopcalite catalyst at room temperature, and the rise in temperature of the air stream due to the heat of combustions is measured with a thermometer. About 60% of the theoretically possible temperature rise is actually observed with the apparatus. By means of a calibration chart, the concentration of carbon monoxide present is read as a function of the temperature increase.

**59I. Volumetric semimicro- and micro-determination of Vitamin $B_1$.**

Wachsmuth, H. *Bull. Soc. Chim. Belg., 56,* 261-67 (1947); *Analyst, 73,* 461 (1948).

Vitamin $B_1$ can be determined volumetrically by adding to an alkaline solution an excess of ferricyanide and titrating the excess iodimetrically or directly with ceric sulfate. The process is accurate and takes only 5 minutes. Aldehydes and reducing sugars do not interfere.

**60I. Methods for determining decomposition in fishery products.**

Allison, A. M. *Assoc. Food Drug Off., 12,* 129-39, Oct., 1948.

A review.

## BIOLOGICAL SCIENCES

### BIOCHEMISTRY

**61I. Inhibition of SH enzymes by methyl bromide.**

Lewis, S. E. *Nature, 161,* 692-3 (1948).

Methyl bromide toxicity may be due to its ability to inactivate SH enzymes. In wheat flour fumigated with methyl bromide it was found that the protein fraction of the flour was mainly responsible for the sorption and decomposition of the methyl bromide. It has been shown that when aqueous suspensions of wool, silk, fibroin, collagen, and gelatin are treated with liquid methyl bromide, methylation of carboxyl groups and peptide linkages occur.

**62I. Researches on starch. XXXIX. Corn amylose.**

Meyer, K. H. et al. *Helv. Chim. Acta, 3,* 108-10, Feb., 1948. (In French).

Corn starch contains a highly polymerized fraction. This is absent in potato starch whose high fraction has a molecular weight of 110,000. Because of this high molecular weight amylose, corn starch paste solidifies more rapidly than potato starch paste. Total fractionation of amylose can be accomplished by successive extractions with water of increasing temperatures. The low polymerized fractions pass into solution first. Corn amylose contains both a high polymer fraction of molecular weight 340,000 and a lower fraction of molecular weight 10,000-50,000. The range of the molecular weights is very wide. Amylose is much less homogeneous than its isomer cellulose.

**63I. Studies on the respiration of the white potato. I. Preliminary investigation of the endogenous respiration of potato slices and catechol oxidase activity.**

Schade, A. L., Bergmann, L., and Byer, Ava. *Arch. Biochem., 18,* 85-96 (1948).

Catechol is an unsatisfactory substrate for the elucidation of the enzymatic systems involved in the endogenous respiration of the potato tuber. It inhibits reversibly the catecholase activity of potato tissue while destroying irreversibly the endogenous respiration. Hence, it appears that catechol acts primarily as a cell poison, capable of disrupting completely the normal metabolic processes on which the viability of the cells depends, and only secondarily as a substrate for tyrosinase. The problem remains undecided as to what extent, if any, tyrosinase acts as the terminal oxidase in the endogenous respiration of potatoes.

## MICROBIOLOGY

**64I. Citric acid. Production by submerged fermentation with Aspergillus niger.**

SHU, P., AND JOHNSON, M. J. *Ind. Eng. Chem., 40,* 1202-5 (1948).

Average yields of 72 grams of anhydrous citric acid per 100 grams of added sucrose were obtained by submerged culture of *Aspergillus niger* in shake flasks on a synthetic medium at an initial sucrose concentration of 140 grams per liter. The fermentation required 9 days. A 70% yield was obtained in 12 days at a sucrose concentration of 260 grams per liter. Data on the effect of changes in composition of the medium are presented. The optimal conditions for shake flask fermentations include potassium dihydrogen phosphate above 1 gram per liter, magnesium sulfate heptahydrate above 0.25 gram per liter, iron concentration of 1 mg. per liter, 2.5 grams per liter of ammonium nitrate, and an initial pH between 2.2 and 4.2.

**65I. Concentration of cobalt by micro-organisms and its relation to cobalt deficiency in sheep.**

TOSIC, J., AND MITCHELL, R. L. *Nature, 162,* 502-4, Sept. 25, 1948.

It appears that, in sheep, the cobalt content of the microbial population of the rumen is related to cobalt concentration in the diet. If cobalt is essential for micro-organisms, but not for the host, then absorption of the element by the host would deprive the micro-organisms of a factor essential for their growth and/or metabolism. It may even be that pining and the other wasting diseases are due to cobalt deficiency of the bacteria, the animal requiring not cobalt, but the bacterial products which have thereby become deficient.

## PHYSIOLOGY

**66I. Radiation hazards in industry.**

WILLIM, C. R. *J. Ind. Hyg. Tox., 30,* 294-99, Sept., 1948.

Radiation hazards in industry, including those of X-ray, low and high voltage, shoe fitting fluoroscopes, radiography, nickel-polonium alloys in sparkplugs, radium-type vacuum gages, self-luminous paints and thorium in gas mantle manufacture, are discussed.

# FOOD PRODUCTS

## BAKING AND BAKERY PRODUCTS

**67I. The effect of shortening stability on commercially produced army ration biscuits. I. Initial data and results of accelerated stability tests.**

HORNE, L. W., STEVENS, H. H., AND THOMPSON, J. B. *J. Am. Oil Chem., 25,* 314-18, Sept., 1948.

An experiment involving the commercial production and packaging of two types of Army ration biscuits prepared from common ingredients with nine lots of vegetable oil shortening of increasing stability values and two lots of lard as the only ingredient variables has been described. Accelerated stability tests on both shortenings and biscuit show that: (1) A linear relationship exists between Swift Stability (A. O. M.) and oxygen absorption (Warburg) values obtained on cottonseed oil and soybean oil shortening. (2) Increasing the accelerated stability values of the shortening by additional hydrogenation of the vegetable oils result in greater accelerated stability values for the biscuits containing the corresponding shortenings. A nearly direct relationship was found between the stability of soybean oil shortenings (Swift Stability Values) with the stability of the corresponding biscuits (Rancimeter). In the case of the cottonseed oil shortenings the increase in biscuit stability was marked to about a 100-hour accelerated stability value, but was much less pronounced above 100 hours. (3) Addition of commercial lecithin increased the stability values of the biscuits containing cottonseed oil shortenings, but had an adverse effect on the stability of biscuits containing lard and lard plus N. D. G. A.

**68I. Silicone aids bakers.**

*Modern Plastics, 26,* 192, Oct., 1948.

D. C. Pan Glaze (a silicon coating) eliminates the need for greasing pans used in baking bread, buns and other bakery goods. It is claimed that one application will give easy release of bread for 100 to 200 bakings.

## COCOA PRODUCTS

**69I. The improvement of cacao products by hot water rinses.**

*D. Sulc. Farm glasnik, 3,* 49-55; *Glass Pack., 27,* 709, Sept., 1948.

When cacao beans were rinsed with water at 65° C. and later dried at 70-80° C., the washing was found to have reduced tannins from 4.1 to 1.86% and the acidity from 35.0 to 15.0 cc. N. sodium hydroxide, without altering the moisture, fat, theobromine, starch, albumin, extractable nitrogenous substances or total nitrogen content of the beans. For beans rich in tannins and acids the hot water wash is said to be superior to roasting. The usual bitter, sour, and astringent tastes are reduced to a minimum, and the mild, delicate flavor of the cocoa accentuated. Improved cocoa and chocolate products are possible from the cheaper grades of cacao.

**70I. The question of unified designation of coloring substances in cacao: cacao red or cacao purple.**

MOSIMANN, G. *Internat. Chocolate Rev., 2,* 111-13 (1947); *Biol. Abst., 22,* No. 11745, 1156, May, 1948.

Fresh beans of the Forastero varieties of cacao contain a purple cyanidin-3-glycoside of glucose or galactose; this glycoside undergoes hydrolysis during fermentation and drying. Catechins and tannins are oxidized to red-brown materials, and a part of the anthocyanin becomes insoluble in alcohol. These coloring matters have variously and inconsistently been called "cacao-red" and "cacao-purple." The history of the terms is discussed.

## FATS AND OILS

**71I. Studies on rancidity of butterfat.**

MUKHERJEE, S., AND GOSWAMI, M. *J. Indian Chem. Soc., 24,* 239-48 (1947); *J. Am. Oil Chem. Soc., 25,* 227 (1948).

Development of rancidity of butterfat on storage with different chemicals has been studied. Effect of hydrogen passed into the butterfat at room temperature has been investigated. The dissolved hydrogen has been found to stop hydrolytic rancidity of butterfat for a period of 5 months and to retard oxidative rancidity to a very great extent. Effects of packaging, pyrogallol, catechol, gallic acid, pyrocatechol, hydroquinol, Na citrate, oxalic acid, coumarin, α-tocopherol, and ascorbic acid were evaluated.

**72I. Studies on the heat inactivation of lysine in soy bean oil meal.**

EVANS, R. J., AND BUTTS, H. A. *J. Biol. Chem., 175,* 15-20, Aug., 1948.

Soybean oil meal autoclaved 4 hours showed that 40% of the protein lysine and any added lysine was destroyed. Enzymatic digestion *in vitro* freed 60% less lysine from autoclaved protein when compared to unautoclaved; 20% of any added lysine was converted to a form liberated *in vitro* by acid, but not by enzymes. This was traced to sugar occurring in the meal. Soy protein alone when autoclaved showed very little loss of lysine. Added sucrose caused 50% destruction of lysine upon autoclaving. Dry heat was not nearly as effective as autoclaving. Two different ways lysine is inactivated are emphasized: (a) total destruction, (b) change into a form which yields only *in vitro* to acid hydrolysis and resists enzymatic digestion.

**73I. Odor and oxidizability.**

MONCRIEFF, R. W. *Food Manuf., 23,* 411-13, Sept., 1948.

Gallic acid and its esters are about equal in activity on a molecular basis, and ethyl gallate was the most satisfactory agent to give protection against oxidation without discoloring or imparting a foreign flavor to the fat. As little as 0.005% ethyl gallate in butter fat retarded the development of tallowiness and the loss of carotenoid pigmentation. In the case of lard 0.01% ethyl gallate was effective at 37° C. in inhibiting oxidation, and in the case of refined and deodorized cotton-seed, peanut, and palm oils the same quantity of ethyl gallate had some inhibiting effect at 25° C. Oxidizability can be used as a measure of food deterioration. If certain enzymes can be inactivated, oxidation may be prevented even on exposure to air of such foods as potatoes and apples. But in order to destroy the oxidase by the inactivator it is first necessary to crush or pulp the fruit or vegetable.

## FISH AND FISH PRODUCTS

**74I. Fish control by refrigeration.**

BRENNAN, W. R. *Refrig., Cold Storage and Air Cond., 17,* 29-32; Jan., 1947; *Refrig. Abst., 3,* 138[8], April, 1948.

Three methods of refrigeration are being adapted to the fisheries of Australia: (1) crushed ice for short trips; (2) combined ice and mechanical refrigeration on longer trips; (3) complete mechanical refrigeration on long trips under tropical conditions and with large catches of fish. The advantages of mechanical refrigeration include: comparatively simple and cheap installation; reduces amount of ice necessary for the trip; holds fish over longer period; fish arrive in better condition. A flow diagram of a brine refrigerating system for a tuna clipper is given.

## FROZEN FOOD

**75I. Effect of fluctuating storage temperatures on quality of frozen foods.**

GORTNER, W. A. et al. *Ind. Eng. Chem., 40,* 1423-26, Aug., 1948.

Pork roasts, strawberries, snap beans, and peas were stored for 12 months at 0° F., at 10° F., and in a freezer fluctuating between 0 and 20° F. Palatability, vitamin analyses, and other criteria of food quality were examined periodically. Exposure to the fluctuating temperature resulted in quality changes similar to those occurring at the average temperature. Inference is drawn that temperatures above 0° F. are undesirable.

**76I. Effect of rate of freezing on bacterial content of frozen vegetables.**

VAN ESELTINE, W. P. et al. *Food Res., 13,* 271-80, July-Aug., 1948.

Peas and whole-kernel corn were frozen very rapidly in liquid air, very slowly at 0° F. packed in insulated boxes, and at two intermediate rates. Freezing in liquid air and in an air blast at — 60° F. resulted in such quick freezing that the bacterial content of the foods was essentially unchanged. Freezing at slower rates allowed multiplication of bacteria before the freezing temperature was reached, but of the increased numbers of bacteria, many were killed by the ordeal of freezing. Freezing in still air at 0° F., a process which can be duplicated in farm or home freezers, seems practical from a bacteriological standpoint. It is essential to package the blanched food and place it in the freezer as quickly as possible to prevent bacterial growth on the food. It is important not to pack the freezer units tightly, as this will result in too-slow freezing of the packages in the center of the stack and bacterial multiplication can be expected to occur. During storage there is a slow death of the bacteria in the frozen state.

**77I. The past and the future of the concentration of wine by freezing.**

I. DE SEZE, R. R. *General Du Froid. 23,* 13-7, Aug., 1946, and II. 11-6, Oct., 1946; *Refrig. Abst., 3,* 133[3], April, 1948.

The separated ice fraction contains appreciable amounts of alcohol which can be partially recovered by centrifugation. The ice is then used for precooling of further quantities of wine to be concentrated. The elimination of part of the water by freezing increases the concentration of solid particles in the remaining liquid phase to the degree of saturation, thus resulting in the sedimentation of potassium bitartrate and calcium tartrate, and in the coagulation of colloidal substances. Concentration changes affect to some extent the organoleptic properties of wine, producing a boiled taste which is not appreciated by every consumer. These changes can be largely avoided by treatment under vacuum and by moderate grades of concentration. Such a treatment generally results in a marked increase of quality. Twenty references.

## FRUIT AND FRUIT JUICES

**78I. Processing fruit juices.**

SINGLETON, G. 2,450,097, Sept. 28, 1948.

The process of treating fruit juices containing peel oil and acid constituents consisting in raising the temperature of the juice to the boiling point in a closed container under a vacuum sufficient to vaporize the peel oil and acid constituents, passing the vapors through a condenser, filtering the condensate to remove the acids and reintroducing the filtered condensate into the container.

**79I. Method for the evaporation and concentration of liquids.**

ZAHM, G. G. Assignor to Hurd Corp. 2,450,774, Oct. 5, 1948.

The method of concentrating liquid food products such as fruit juices, beverages, extracts and infusions, which method comprises rapidly flowing the liquid food product in a thin film over a heat exchange surface under high vacuum and thereby separating the liquid food product into a concentrate portion and a vapor portion directly into a first condenser without breaking the vacuum and thereby initially reducing the water content of the flavor-producing constituents, passing the residual vapors directly into a surface condenser without breaking the vacuum and thereby finally condensing substantially all of the residual vapors to form a concentrated liquid fraction containing the flavor producing constituents, and reintroducing the liquid fraction into the concentrate portion thereby restoring to such concentrate portion the flavor producing ingredients originally therein present.

**80I. Critical discussion on the Katadyn process, with special reference to its use in the soft drinks industry.**

BEGER, H. *Pharmazie, 2,* 359-61 (1947); *Brit. Abst.,* BIII, 218, Aug., 1948.

Experience with the Katadyn process for making $H_2O$ sterile in Berlin during recent years is described. It has worked satisfactorily in spite of the adverse conditions, it is particularly valuable for sterilizing $H_2O$ for mineral-water works, and there is no evidence of poisoning or adverse effect from the presence of Ag in the $H_2O$. In view of the danger of infection after treatment under present conditions in Berlin it is suggested that mineral-waters should be treated continuously.

## PECTIN—JAMS AND JELLIES

**81I. Grading pectins.**

BAKER, G. L., AND WOODMANSEE, C. W. *Canner, 107,* 18-20, Oct. 16, 1948..

A method of grading approaching a use method should be standardized for the industry. An abridged discussion of popular grading methods is given. Specifically recommended are: (1) the use of a synthetic juice buffer salt solution in the jelly procedure, (2) measurement of the breaking strength rather than the sag of the jelly and (3) a statement by the manufacturer of the optimum pH range of gelation and the methoxyl content of the pectin.

**82I. Preservers' stake in uniform pectin grading.**

MESCHTER, E. E., AND LATAILLADE, L. J. *Food Pack., 29,* 38, Oct., 1948.

One more method is presented to simplify and employ the good points in all manufacturers' test methods. Tarr-Baker top strength and slice tests were tried as well as the Rigidometers (Western Regional Lab.) and the Ridgelimeter (Cal. Exchange). The latter two gave good agreement. Tarr-Baker methods are very sensitive to rate of application of pressure. Apple pectins came out better on break-strengths while citrus pectins showed better characteristics in rigidity tests. It is suggested that both types of tests be applied. The Rigidometer for rigidity and a modified Stoloff technique for break strength of slices using a dietary scale and reading the pressure required to break the slice.

## VEGETABLES

**83I. What makes popcorn pop?**

*Iowa State College Bull.* P-54. *Peanut J. and Nut World,* 27, 54-5, Oct., 1948.

Popping expansion is determined by the relative percent and location of hard and soft starch in the kernel and the proper moisture content. Moisture content, the more important of the two, is best at a 12-13%. If the moisture is below 11 or above 14%, popping will be unsatisfactory.

# Regional Section News

(Continued from page 6, preceding technical papers)

members of the Section as of September 15, 1948, are also included. An interesting feature is a reproduction of the charter of the Western New York Section, for the benefit of those members who have never seen it.

Our congratulations are extended to the Western New York Section and to its editor, Walter Pheteplace —also to its poet!—for their enterprise in initiating this publication. May the members of the Section cooperate actively with their editor, to make this new venture their own and thus guarantee its success.

W. D. Graham, formerly Chemist for Fanny Farmer Candy Shops, Inc., Rochester, N. Y., is now Chemist for Firmenich & Company, New York City, manufacturers of flavors.

Dr. Willis Gortner has resigned his position of Associate Professor of Biochemistry in the School of Nutrition of Cornell University and has accepted a position as Research Chemist for the Pineapple Research Experiment Station, University of Hawaii, Honolulu, Hawaii.

Frank A. Lee, Associate Professor of Chemistry of the New York State Experiment Station, is a member of the Publicity Committee for the 1949 San Francisco I. F. T. meeting.

Dr. Frank Lee and Dr. Willis Gortner gave a paper entitled "Effect of Freezing Rate on Vegetables" at the 44th Annual Meeting of the American Society of Refrigerating Engineers, Washington, D. C., on December 8.

According to its Directory, the Western New York Section has 173 members, of whom 114 are members also of the national I. F. T.

## GREAT LAKES SECTION

The Great Lakes Section will hold its third meeting of the year at 2 p. m. on April 15, at Detroit, Michigan, in the Engineering Society Building. There will be speakers in the afternoon and the evening, officers for the coming year will be elected, and the progress made during the past year will be discussed.

## MARYLAND SECTION

At the December 1948 meeting of the Maryland Section the following officers were elected for 1949:

Chairman: Frank Feild, Federal Yeast Corp., Colgate Station,, Baltimore, Md.
Vice-Chairman: Maurice Siegel, Strasburger & Siegel, Baltimore, Md.
Secretary: Joseph Winter, Crosse & Blackwell Co., 6801 Eastern Ave., Baltimore 24, Md.
Treasurer: Edgar Heyl, Products and Process Research, Baltimore, Md.

Dr. A. H. Warth of the Crown Cork & Seal Company continues to serve as Section Councilor for the national Institute for another year.

Clifford F. Evers has become head of the U. S. Fishery Technological Laboratory at College Park, Maryland. He was formerly Technical Director of the National Association of Frozen Food Packers, in Washington, D. C.

## PUGET SOUND SECTION

Members of the Puget Sound Section met in Vancouver, British Columbia, Canada, on November 19 and 20, for a joint meeting with the British Columbia Food Technologists' Association. The latter is composed of 74 members, twenty of whom are members of the Institute of Food Technologists.

The first session, held on the evening of November 19, was called to order by Mr. C. Wilson Eddy, Chairman of the Vancouver Association, in the Province Newspaper Model Kitchen Auditorium. Mr. William Lantz, Director of the Domestic Fisheries Experiment Station, Vancouver, B. C., presented a paper on "The Packing Industry." This evening meeting included a social hour and a tour of the Model Kitchen Auditorium, with talks by attendants in charge, explaining the purpose of the demonstration kitchens.

On the morning of November 20, a tour was conducted through the meat packing plant of Canada Packers, Ltd., by Mr. Murry Horton, the firm's Manager and Chief of its Biological Products Division. This was followed by a tour through the laboratories and the plant of the Canadian Fishing Company, Ltd., under the guidance of Mr. Harry R. Beard, the firm's Research Director.

The final tour of the meeting was through the Library, the Chemical Laboratory, and the Chemical-Engineering Laboratory of the University of British Columbia, conducted by Dr. B. A. Eagles, Head of the University's Food Technology and Dairy Divisions.

The successful meeting concluded with a luncheon at the University's Faculty Club.

## MOHAWK VALLEY SECTION

Thirty-four members and guests attended the December 16 meeting of the Mohawk Valley Section, held at the Canajoharie Hotel. After a pleasant dinner and a short business meeting, Chairman Allison Burhans introduced the speaker, Dr. Otto A. Faust, pediatrician, who gave an interesting talk on problems in nutrition.

## IOWA SECTION

Arrangements are nearing completion for a joint meeting of the Iowa Section of I. F. T. with the local section of the American Chemical Society, at which Ernest C. Crocker of Arthur D. Little, Inc., Cambridge, Mass., will be the principal speaker. Mr. Crocker's lecture tour through the Middle West has made these arrangements possible. The tentative date for the meeting is February 21.

The Iowa Section has compiled a Directory of Members. This Directory, which was mailed at the time of sending out the minutes of the October 1948 meeting, shows that there are sixty-nine members in this Section. Of these, thirty-nine are located in Ames. The remainder are in Clarksville, Muscatine, Waterloo, Reinbeck, Burlington, Marshalltown, Ottumwa, Cedar Rapids, Des Moines, and Storm Lake in Iowa, in Omaha, Nebraska, and in Fairmont and Austin, Minnesota.

A new and specially designed laboratory for research and teaching of food processing and food technology was opened in November 1948 at Iowa State College. Operations at this laboratory are directed by Dr. R. G. Tischer, a member of the Iowa Section.

# Lift your foods to a flavor peak

## with Ac'cent®

### PURE MONO SODIUM GLUTAMATE

*Ac'cent* improves the flavors in most meat products, poultry, fish and vegetables in freezing or canning methods. Samples will be sent upon request along with more specific information outlining the suggested testing procedures. *Ac'cent* is available in 200 pound units for bulk purposes.

Trade-Mark "Ac'cent" Reg. U. S. Pat. Off.
Printed in U. S. A.

In fresh, frozen or canned foods, AC'CENT does a natural flavor-lifting job that can't be matched. It can be depended upon to balance, blend, and intensify the total flavor effect without imparting any flavor of its own. These unique characteristics have their place in all branches of the food industry—in countless varieties of foods.

AC'CENT is mono sodium glutamate at its best—produced solely from vegetable sources and always over 99% pure. Many leading food processors use it constantly to raise the flavor standards in familiar products. Progressive chefs in hotels, restaurants, and institutions find that AC'CENT increases the demand for their dishes when it is added to their regular recipes.

AC'CENT, the leading brand of MSG, is no longer unfamiliar to homes all over the country; as homemakers are quickly taking the cue from exuberant food editors who are reporting its wonders.

Now is the time for all those in the food processing industry to find out what AC'CENT can do for them. Only a few comparative tests are needed to measure the difference.

Write for the answers to your questions about adapting AC'CENT to your own formulas. Prove to yourself that AC'CENT does make food flavors sing.

## Amino Products

**DIVISION**

**INTERNATIONAL MINERALS & CHEMICAL CORPORATION • 20 NORTH WACKER DRIVE • CHICAGO 6, ILLINOIS**

# Industrial and Legal Viewpoints

## Sanitation Problems in the Fishing Industry*

STANLEY P. HURLEY
*Gorton-Pew Fisheries Company, Ltd., Gloucester, Massachusetts*

**The author reviews progress in solving sanitation problems in the fishing industry and makes recommendations regarding further progress in this field.**

A few years ago the Northeast Section of I. F. T. held an all day meeting. During the morning, several papers were presented in which the fishing industry was subjected to a considerable amount of criticism for laxity in sanitation. When the chairman suggested that the speakers would be happy to answer any questions which may have occurred to the audience, only one was asked, and that was whether or not fish would be served for lunch.

It is regrettable that some of the factors mentioned that day which prompted the lone question are still unsolved problems in the industry. On the other hand, considerable progress has been made on many of them and others have been solved in accordance with the best available technical information.

The fishing industry is no different than any other food industry as far as the usual every-day problems of sanitation are concerned. By "usual, every-day sanitation problems" we refer, of course, to such problems as good housekeeping and rodent and insect control. However, since the fishing industry is very close to being the oldest industry in the country, our plants have had slightly longer to weather the storms and our rodents and insects are slightly older and, consequently, slightly wiser.

The usual, every-day problems are just that: every-day problems; and, of course, only constant attention keeps them from becoming acute and serious. It seems, however, that in a good many cases we have looked at these every-day problems with a more technical approach than heretofore, and by thought, design and adaptation have changed every-day to once a week, once a month, or even a longer interval and, at the same time, have greatly improved the efficiency of the control over the problems. For example, several years ago, insect control meant only a skillfully planted rubber boot, and rodent control consisted of a well-aimed shovel in the hands of a dock worker. Today the insect control program in our industry consists of adequate screening when conditions permit and frequent periodic application by thoroughly trained personnel of modern insecticides such as DDT, Chlordane, Hydrogenated Rotenone and Pyrethrins, to name a few, combined with such materials and procedures as "aerosols" and "mist spraying." In rodent control work, we have been extremely successful with installations utilizing ANTU and, in the plant of Gorton-Pew Fisheries Company, Ltd., the rigidly controlled use of 1080 in certain localities of our buildings has given us success which was previously thought impossible to obtain.

An important factor in any food processing plant is, as we all know, its water supply. We in the fishing industry are fortunate, that is, most of us are, in having one of the largest water supplies possible available right in our own backyard. Of course, we realize the limitations of this source of water and our obligations to the consuming public with regard to its use. For many years this company has chlorinated all of the salt water supply used freely in all its wharf and cutting room operations to meet drinking water standards. Within the past year, however, we have gone one step further with the application of an in-plant chlorination installation which automatically maintains a free chlorine residual beyond the break-point. Thus we have available throughout our system not only a completely sterile water supply, but one containing a bactericidal agent at all times.

A survey was made during the earlier months of the installation to determine the value of this treatment and the accompanying table presents some of the data that was collected. Sampling stations were chosen throughout the plant and samples of incoming fish, scaler discharge water, drips from cutting belts, swabs on belts and cutting boards were taken at two-week intervals. The counts which were obtained, of course, showed some variation, but, in general, after several samplings a definite pattern became noticeable. The survey was divided into three parts: a 6-sample period of Break-point Chlorination, with residuals of 5 to 10 p.p.m. during the day and 25 p.p.m. during the clean-up periods; a 6-sample period of Marginal Chlorination, with residuals of 0.1 to 0.2 p.p.m.; and a repeat period of the Break-point type. In order to compensate for the variations in counts which occurred in Station 1, which represents incoming fish from the boats, all of the Station 1 counts were considered equal to 1 and the

AVERAGES OF RATIOS OF STATION COUNTS TO INCOMING FISH

| Station | Break-point Chlorination 5 p.p.m. | Marginal Chlorination 0.1-0.2 p.p.m. | Break-point Chlorination 5 p.p.m. |
|---|---|---|---|
| 1 | 1.0 | 1.0 | 1.0 |
| 2 | 0.06 | 20.2 | 0.022 |
| 3 | 2.3 | 295.0 | 0.09 |
| 4 | 0.4 | 39.2 | 0.14 |
| 5 | 0.5 | 43.6 | 0.28 |
| 6 | 1.1 | 191.0 | 0.67 |
| 7 | 3.3 | 20.5 | 0.16 |
| 8 | 0.35 | 216.0 | 0.32 |
| 9 | 1.1 | 29.8 | 0.17 |
| 10 | 4.5 | 29.7 | 0.63 |

Station 1—Incoming fish
Station 2—Drip from scaler
Station 3—Drip from belt leading from scaler
Station 4—Swab of same belt
Station 5—Drip from far end of same belt
Station 6—Drip from cutting belt nearest scaler
Station 7—Swab of same belt
Station 8—Drip from far end of same belt
Station 9—Swab of cutting bench
Station 10—Finished fillet from brining tank

* Presented before the Northeast Section, I. F. T., Boston, Mass., Feb. 7, 1949.

corresponding counts for each sampling station were computed as ratios to this figure. This table simply shows the averages of these ratios to incoming fish counts. In general, the ratios during Break-point periods are less than 1, indicating considerable bacteria destruction, while during Marginal Chlorination periods, the figures indicate clearly that build-ups in counts throughout the room were common.

Apart from the bacteriological data which was obtained during this survey, two other direct benefits from the use of break-point chlorination were noted. The first was marked reduction of odors in the areas serviced by the salt water supply and the second was the elimination of slime on working surfaces which come in contact with this water. There is no question that both of these benefits tend toward the aesthetic side, but the presence of any off-odors in a plant is not a healthy condition nor conducive to a good product; furthermore, its effect on customers and guests who are visting is not desirable.

C. H. Castell of the Fisheries Research Board of Canada in "Progress Report of the Atlantic Station No. 40" reports that it required about 200 p.p.m. free chlorine residual to affect the flavor of fillets and about 2000 p.p.m. to affect the color. Since we were operating with a residual of 5 to 10 p.p.m. while operating and 25 p.p.m. during clean-up periods, we were confident that no harmful effects would result from this work and we are in complete agreement with the statement by Mr. Castell that, "It is safer and cheaper to increase the keeping quality of fillets by keeping the bacteria from getting on them by having sanitary surroundings, rather than by trying to destroy the bacteria on the fish by chlorinating them."

Another source of trouble in our industry which is somewhat allied to water treatment and which must be very carefully watched, is brine tank contamination. The mechanical action of flushing of fillet surfaces in brine prior to packaging and freezing very quickly builds up high bacterial counts in the brine as well as the dissolved and suspended protein concentration. For some time the only control of this problem was change of the brine at frequent intervals. Temperature control of the brine is an aid toward solving this problem, but it is definitely not the complete answer; consequently, a great deal of work has been done on this problem in recent years and is continuing. Chlorination has proven to be effective to some degree, but in many brine systems it is not completely satisfactory because residuals are difficult to maintain at predetermined levels. This difficulty arises because of the large amounts of organic materials present in brining systems, and the lack of a constant flow of fillets to and from a good many of them. Some work has been done on the use of quarternary ammonium compounds in connection with this problem, but these substances, too, have drawbacks. There is no doubt of their effectiveness in the sanitizing of the brine system, but difficulties in method of application are still bothering us to some extent. The most recent approach to the solution of this problem is the use of ultraviolet radiation combined with filtration but, here again, although we are able to demonstrate effectiveness, difficulty in adaptation of design of equipment is still a source of trouble. It appears, however, that before very long either one or combinations of more than one of these methods of treatment will give us brine to use for much longer periods, with its quality level, from the standpoint of sediment and bacteriological condition, raised to a much higher plane than has heretofore been reached.

General cleaning methods within our industry have, like the other factors mentioned above, also been changed to some degree. The packing of fish products is, by nature, not an easy job from the standpoint of wetness, waste and trimmings. To quote my good friend, Mr. John Kaylor, "One can no more fillet fish without producing some scrap than one can saw a board without producing sawdust. But, the presence of these bits of fish accumulated to an unnecessary degree or left for long periods without removal is an unsanitary practice and is not to be tolerated." The cleaning of equipment in fish processing plants is still, primarily, a scrub and rinse project, but some of the scrubbing necessary has been reduced, by the use of modern detergents, wetting agents and salt water soaps, while the over-all efficiency of the cleaning program has been increased. Since in our industry the removal of protein is the primary problem, some detergents are valuable and others are worse than useless. Considerable attention is due the temperature of the water that is used. Warm water is sometimes valuable, at other times hot water coagulates finely divided protein so severely that the removal job becomes more difficult than if heat were not applied. Live steam for some applications does a superlative job, but if thermophilic organisms are present, then warming up the equipment during a clean-up prior to an 8 or 10 hour shutdown is apt to cause difficulty. Considerable success has been attained through the use of a high pressure pump which supplies water at 500 pounds per square inch, and at that pressure the material clinging tenaciously to the equipment is rather easily dislodged and then flushed away with large volumes of water at normal pressures.

Advancement in cleaning methods is, of course, also due to improvement in equipment design. In many of the plants in our industry one can still find wooden equipment of varied ages; but, also, one can find that the use of galvanized iron and, best of all, the use of stainless steel is becoming more common than in the past. The corrosion problem in the fisheries is probably the most severe of any food industry with salt, water and salt air always present. Corrosion is, of course, an enemy of good sanitation practice, since nothing can be more difficult to keep clean than an apparently smooth surface that is pitted. The intelligent use of the correct type of stainless steel for each individual application has done much to improve the over-all sanitary condition of our industry. There is still much to be done along this avenue, however, before we will be able to rest even for a moment.

Any discussion of the sanitation program in a food industry should include a few remarks about the personal habits of the people employed in it. In many of our plants you will see workers who are neatly attired with suitable coverings for the head and hands. In addition, physical examinations are a prerequisite to